**Background**

- Controlling eating rate may be a mechanism for reducing total calorie consumption (Robinson et al. 2014, Am J Clin Nutr).
- Further research is needed to understand mechanism.
- Need to understand physiological basis to design effective weight loss interventions.
- Aim: To examine whether the brain’s response to a meal differs according to how fast that meal is consumed.

**Hypothesis**

- Experimentally slowing eating rate will lead to:
  - Greater signal change in satiety-responsive brain areas.
  - Increased ghrelin suppression and increased PYY secretion.
  - Reduced enjoyment and satisfaction.
  - Greater feeling of fullness post meal.
  - Improved memory of the meal.
  - Reduced subsequent food intake.

**Methods**

- Normal BMI, aged 18-35 years.
- 20 participants randomised age, gender, BMI, DEBQ restraint score.
- Fasted for 12 hours overnight.
- FMRI scan at baseline and 2 hours post-meal (with memory task).
- Randomised to consume meal in 6 min (normal) vs 24 min (slow).
- 600 kcal meal of macaroni cheese.
- Mouthful of specified size taken each time computer beeped.
- Appetite ratings recorded every 30 minutes for 3 hours post-meal.
- Bloods tests (PYY, Ghrelin) every 30 minutes for 3 hours post-meal.
- Task based on imaging study of memory (Kwok et al., 2015, Hum Brain Mapp) with 3 aspects of episodic memory tested: 1) spatial (room trials), 2) temporal (interval trials), 3) recognition (portion trials).
- Ad libitum snack meal 3 hours post meal: 1000 kcal snacks (cookies and crisps) with 10 minutes to eat until comfortably full.
- FMRI data processed using FEAT (FMRI Expert Analysis Tool) v 6.0.

**Results**

- No differences between groups in randomisation criteria, baseline mood/appetite ratings, or pleasantness ratings in the taste tests.
- Enjoyment and satisfaction higher in normal group (effect size = -0.5).
- Ghrelin suppression was greater in the slow group than the normal group at 30 and 120 mins post-meal.
- Ghrelin at 180 mins correlated with ad-libitum intake (r=0.59, p=0.013).
- PYY levels at 30 mins correlated with enjoyment of meal (r=0.451, p=0.046) and memory task activation in precuneus, striatum and insula.

**Conclusions**

- Experimentally slowing eating rate lead to:
  - Greater signal change in satiety-responsive brain areas.
  - Increased ghrelin suppression and increased PYY secretion.
  - Reduced enjoyment and satisfaction.
  - Greater feeling of fullness post meal.
  - Reduced subsequent food intake.
- fMRI provides information about potential underlying processes.
- Encouraging results for design of interventions: slow group ate 25% less.

**References**

- No conflicts of interest.